

Alabama current connection

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The Lodge at Gulf State Park: *Raising the Bar for Resilient Coastal Design*

By TOM HERDER, MOBILE BAY NATIONAL ESTUARY PROGRAM

The resurrected Lodge at Gulf State Park provides a model of coastal resilience, which this issue's Estuary Reflections called "not only bouncing back from hardships, but bouncing back better." The original Lodge, constructed on 42 acres of dunes in 1974, included 144 rooms in 12 two-story buildings with a separate lobby, restaurant, and meeting space. For 30 years, the Lodge was a popular destination for Alabama families and out-of-state visitors, before it was destroyed by Hurricane Ivan on September 16, 2004.

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Currently Inside



The beach-front deck at the Lodge

The Lodge at Gulf State Park

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For the next 14 years, the property stood vacant, but, as has been the case for many other environmental initiatives, the *Deepwater Horizon* oil spill in 2010 provided a source of funding for a resilient transformation. When early Natural Resource Damage Assessment (NRDA) funding was made available to the State of Alabama in 2011, in part to compensate for its people's lost use of injured resources, planning began to rebuild the Gulf State Park Lodge and enhance the 6,500-acre park with 50 acres of restored dunes, an interpretive center, a learning campus, 28 miles of new and enhanced trails, and numerous other public access amenities.

Understanding the importance of the coastal environment to the economy, the State wanted to show how mindfully constructed buildings and development could contribute to a restored environment. The new Lodge opened on November 1, 2018, with more than twice as many guest rooms (350) but, at only 16 acres, occupying only a fraction of the original Lodge footprint. It is set 200 feet back from the coastal construction line and primary dunes, allowing for the development of secondary dunes. Natural dune landscape was maintained not only to provide habitat for beach mice, migratory birds, and nesting sea turtles, but also to contribute to the Lodge's strength and resilience.

Guests arrive to encounter a spacious lobby with a wall of windows showcasing

the beach and dunes with glass designed with a very fine pattern to keep birds from striking them. A walkway leads from the lobby west to the Lodge's restaurant and Conference Center, which includes meeting space, a ballroom with a beach view, and a covered gathering porch. The parking lot, landward of the Conference Center, is hidden from common view. Another walkway to the east leads to the three five-story buildings housing the guest rooms. Rooms facing south overlook the beach and Gulf, while those facing north overlook the State Park and Lake Shelby across Highway 182. Each floor of guest rooms is themed with activities featured for park users.

Green certifications and awards attained by the new facility reflect the State's priorities. Gulf State Park received a 2020 Phoenix Award from the Society of American Travel Writers and was described as "an international showcase for environmental and economic sustainability, as it demonstrates best practices for outdoor recreation, education, and hospitable accommodations." The award is given annually to destinations that showcase responsible, sustainable tourism, including conservation, preservation, beautification, and anti-pollution efforts.

The Lodge used the LEED (Leadership in Energy and Environmental Design) green-building rating system to measure building performance in terms of water conservation, energy conservation, healthy indoor environments, and wise material use. This designated LEED Gold facility collects water from air conditioning

condensation generated by each room, filters it, and uses it to "top off" the pool, saving 14,000 gallons of water per month. Buildings conserve 1.85 million gallons of water annually and reduce energy use by 33%. Air-conditioning systems cut off automatically when a balcony door is open for more than two minutes. The Lodge provides customers large, refillable bottles of shampoo, conditioner, and body wash instead of the traditional travel-sized ones that create plastic waste. All trash cans on the property collect recyclables as well as refuse. Easy-to-read signs throughout the property tout the Lodge's environmental priorities and initiatives in subtle, educational ways.

The Lodge is now the first hospitality project in the world to achieve a SITES Platinum rating for sustainable landscapes. The SITES rating system was used to measure the success of dune restoration and other landscape initiatives at the Lodge. Traditionally, hotel landscapes mostly serve as "decoration" and require lots of water, energy, and chemical pesticides and fertilizer to maintain. In contrast, the Lodge landscape provides habitat for wildlife, buffers buildings from future storm surges, and naturally filters and absorbs stormwater through wetlands and swales. The Lodge parking area is paved with a permeable surface, allowing water to infiltrate naturally, and rainwater flows from building surfaces through oversized gutters down rain chains for collection and diversion to wetland areas.

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Track the Tides:

Citizens Monitoring Flooding From Home

By CLARA ZUBRICK, EDUCATION SPECIALIST AND ERIC BRUNDEN, STEWARDSHIP COORDINATOR,
WEEKS BAY NATIONAL ESTUARINE RESEARCH RESERVE

Track the Tides is a citizen science project led by the Weeks Bay Reserve that aims to increase awareness and local knowledge of nuisance flooding among residents of Fish and Magnolia rivers and provide researchers with valuable data on these flood events. Nuisance flooding, sometimes referred to as “high-tide flooding,” occurs when local sea level temporarily rises above the minor flooding threshold set locally by NOAA’s National Weather Service. These floods happen in the absence of storm surge or riverine flooding. When water levels surpass the threshold, different threats to public safety arise. Communities might be faced with road closures, damage to infrastructure, and overwhelmed storm drains (<https://statesummaries.ncics.org/chapter/al/>).

The project utilizes educational trainings to fill in the gaps concerning what nuisance flooding is and its regional impacts on coastal communities. Following the trainings, willing participants host a stream gauge used by the homeowner to monitor and report water depth during flood events. Stream gauges, also known as staff gauges or water depth gauges, are vertical boards with graduated markings – like a large ruler – that indicate water depth. The gauges are installed by Reserve staff during periods of low precipitation and calm conditions at a water level correlating with water level measurements at the Weeks Bay Tide station. These low-profile gauges are installed on waterfront owners’ decks or boathouses, and project participants simply snap a photo of the water level reading and submit the image via text to researchers at the Reserve. An additional project goal is to record how often and to what extent



localized flooding occurs due to rainfall and storm events outside of what would be considered a “nuisance flood.” Therefore, select sites are asked to host rain gauges to collect precipitation data at key locations throughout the Weeks Bay Watershed.

Finally, the Track the Tides project also aims to increase awareness about marine debris and steps homeowners can take to prevent litter from entering waterways. Anything from coolers to those colorful flamingo lawn ornaments can be swept up in a flood event. Many man-made materials are persistent, and when they are either intentionally or unintentionally introduced into the watershed, contribute to the larger plastic pollution problem that plagues our estuaries and world oceans. Marine debris can impact shorelines, disrupt food webs, and significantly decrease the aesthetic value of waterfront and the ability to appreciate nature’s beauty and restorative properties.

All of the data collected from this project can be used to track the timing and influence of tides and rainfall events on water depths within the rivers. When it is compared to precipitation data, researchers can better understand

the timing and extent of localized flooding from storm events. A better understanding of these dynamics will help inform management decisions for protecting homeowners and the environment during nuisance flood events. If you think you might be interested in learning more or hosting a staff gauge, contact the Reserve at (251) 928-9792 or e-mail Stewardship Coordinator Eric Brunden at eric.brunden@dcnr.alabama.gov.



Estuary Reflections

Hurricane Sally bearing down on the Alabama coast

Bouncing Back Better: *The Value of Experience in Improving Coastal Resilience*

BY GUEST AUTHOR HERNDON GRADDICK, MOBILE BAY NATIONAL ESTUARY PROGRAM FOR MBNEP DIRECTOR ROBERTA SWANN

With spring approaching, we welcome mild weather, the promise of longer days, the warmth of the sun, and outdoor life. With another hurricane season around the corner, this issue of the *Alabama Current Connection* focuses on one of the things people who work and play in coastal Alabama particularly value: resilience. Each of the articles in this issue addresses how important it is to be prepared not only to bounce back, but to bounce back better. Guest author Herndon Graddick reflects on this value in this issue of *Estuary Reflections*. Roberta Swann

Merriam Webster defines resilience as “an ability to recover from or adjust easily to misfortune or change.” I put it in simpler terms: “how we bounce back.” Resilience is about how we face up to life’s challenges.

In the last “*Estuary Reflections*,” Roberta wrote about some of the skills that enable individuals and communities to bounce back. In this issue, we’ll examine ways true resilience isn’t just about bouncing back from hardship. It’s also about how we use those difficulties and lessons we learn from them to bounce back better.

The Greek philosopher, Plutarch, said “the measure of a man is the way he bears up under misfortune”- the nature of his resilience. Looking at resilience in an individual, when we as people go through hardships from which we have to bounce back, these are also always periods of personal growth. We don’t just return to the way we were. Truly bouncing back also means becoming wiser, stronger people, better prepared for the future.

In overcoming each challenge life throws at us, little by little we get better. It’s why advanced societies place such an

emphasis on the wisdom of elders. Those who have learned the most from lessons understand best how to cope with new ones.

True resilience is the same in communities. In overcoming each community challenge, we get iteratively better in our capacity to respond. This truth is particularly easy for us to see here in coastal Alabama in how we have learned to recover from hurricanes and tropical storms.

Take for instance how my local utility provider, Alabama Power, has responded to hurricanes through the years. From 21 days to restore power after Frederic in 1979, 10-12 days after Ivan and Katrina in 2005, to four days after Sally last fall, we are getting our lights back on quicker after storms. Alabama Power has achieved these improvements in part through the evolution of “mutual assistance agreements.” Mutual assistance agreements are cooperative

contracts with other power companies around the country, where best practices are shared and resources sent to affected regions when disaster strikes.

Mutual assistance agreements allow crowd sourcing of resources and expertise across the nation's power grids. When one region is facing an event resulting in widespread power outages, power companies from unaffected areas will send crews to quickly help reestablish service. During Hurricane Sally, more than 4,400 workers from 14 states joined Alabama Power crews to replace 1,500 spans of wire, 400 poles, and 500 transformers. Shortly thereafter, our local crews were dispatched to Louisiana to help recovery from Hurricane Delta. With everyone's help,

power companies around the country are steadily getting better and better at getting the lights back on more quickly.

This iterative improvement in response to major storms is also particularly evident in communities with long-time residents, where knowledge is acquired and wisdom passed down through generations. If you grew up in lower Alabama, your family will likely have its own such experience. The Mobile Bay National Estuary Program recently produced a film focusing on this type of resilience.

Called *The Flight of the Frigate Bird: An Omen of Rising Seas*, the film documents traditional ecological approaches to storm preparation and resilience realized by generations of Dauphin Islanders. Some

of these long-developed approaches included practices of building homes behind intact dunes, protecting maritime forests on the east end of the Island, and avoiding construction altogether on the more storm-vulnerable west end. Other ecological wisdom passed down over generations included the knowledge that the appearance of frigate birds gliding in the skies over the Island was often an indication of a major storm on the way.

We are even getting better at the way we pursue resilience in the watershed management planning approach. In fact, many of the projects described in this issue of the *Alabama Current Connection* that focus on resilience were recommended in watershed management plans that used climate vulnerability assessments to prioritize them. Climate vulnerability assessments are resilience tools that use models to predict how sea level rise will affect coastal marsh habitats or how storm surge impacts could affect critical human infrastructure.

Meanwhile, environmental management continues to get better in other ways as well. Many of the engineering firms involved in developing management plans for coastal watersheds have learned with us through a decade of extensive planning. Not unlike the mutual service agreements across power grids or the ways generational knowledge is passed down on Dauphin Island, a surprising level of sharing and cooperation between highly competitive planners has evolved. This has allowed the MBNEP Management Conference to learn from previous efforts, improve the process, and better build resilience through project implementation and restoration. Businesses and industry increasingly find their way to the table to find common ground with environmental leaders, resulting in improvements in community and environmental resilience.

The watershed planning approach relies upon the community to identify problems and suggest solutions that increase resilience. If you have ideas or suggestions about how we can bounce back better, let us know at info@mobilebaynep.com.



Non-local power companies responding to Hurricane Sally in Mobile



Coastal Corner

By WILL UNDERWOOD, COASTAL SECTION ADMINISTRATOR,
ALABAMA DEPARTMENT OF CONSERVATION AND NATURAL
RESOURCES, STATE LANDS DIVISION

Reflections on Hurricane Sally and Melinda Mae



A 2016 photograph of Will's father, Vic Underwood, and Will's oldest daughter, Evi, under the old live oak tree east of the family home that became a casualty of Hurricane Sally.

Greetings from the Alabama Coastal Area Management Program. I hope you are enjoying the new year and planning all the ways that you can conserve and enjoy the natural abundance of the Gulf Coast in the coming months. I'm sure you are all anxious for the arrival of spring, but Mother Nature has certainly reminded us of her power and timing with arrival of an arctic blast in February. While I, too, am ready for spring wildflowers and warmer days, this cold snap has provided the perfect opportunity to sit in front of the fire and contemplate life on the coast.

To paraphrase Conservationist Aldo Leopold, one of the dangers in not owning a farm is in supposing that heat comes from the furnace. He went on to note that someone who had cut, split, hauled and stacked his own good oak firewood has

little danger of forgetting where the heat really comes from. As I write this column, I am being warmed by the heat of the old live oak that once stood just east of my home. I played in the branches of this tree as a child, it served as a playground for my own two girls as they swung from the rope swing hanging from the limbs, and my late father hosted many community fish fries under its massive canopy.

In another show of the power of nature, Hurricane Sally brought the old giant crashing to the ground in September 2020. I have been slowly chipping away at the hulking mass of the tree with chainsaw and axe, and while I still have a way to go, I am not giving up. I'm reminded of the Shel Silverstein poem about Melinda Mae who ate a whale... "She thought she could, she said she would, so she started right in at the tail." In the days following the hurricane, I climbed up to the top of the tree, trying to come up with a plan to avoid the expense of a tree service while

also avoiding any missteps that would necessitate medical care. The view of the devastated landscape visible from the top of the tree reminded me of the fragility of our modern human condition. In spite of all of the technological advances that we rely on in our daily lives for comfort and convenience, we are all one natural disaster away from experiencing the Gulf coast of our ancestors without electricity, gasoline, and food from the grocery store.

Given the great damage to our homes and infrastructure, you might wonder about the damage to natural habitats from the brutal winds of Hurricane Sally. In general, natural habitats are quite agnostic to the impacts of natural disasters. What we might characterize as good or bad doesn't really translate to natural communities. Trees falling from windthrow simply create gaps to allow other trees and shrubs to compete for sunlight. Flooding from storm surge ebbs and flows into the marshes and forested wetlands surrounding our waterways, depositing sediments and nutrients that will support the next generation of life. In surveying the damage around Weeks Bay, we found the greatest loss of trees to be in those stands that were either replanted following agriculture or heavily stocked with "off-site" species such as water oaks on sites better suited to longleaf pines.

I'm sure that it will be many years before the memories of Sally fade from our minds, as it certainly brought back many remembrances of Hurricane Frederic, the first storm in my personal hurricane lexicon. While those memories may be vivid in our minds, we can be comforted in knowing that the natural communities we all value have a much shorter memory for the insults inflicted on them by hurricanes. And as for us, we will recover from this storm and the next...because we said we would.

Sink or Swim?

Communities Can Tackle Flooding Together

By AMY GOHRES, SENIOR PROJECT MANAGER, ALTA SPRING LLC AND MICHAEL SHELTON, COASTAL TRAINING/WATERSHED PROGRAM COORDINATOR, WEEKS BAY NATIONAL ESTUARINE RESEARCH RESERVE

Flooding affects all communities in coastal Alabama. It is important to have a forum or “user group” where local communities can meet, share, learn, and communicate information about flooding and how to improve flooding management and outreach. To help meet this need, a flooding user group, the South Alabama Flood Engagement Team (SAFE-T) was formed as part of the Community Resilience Initiative (CRI).

The five-year CRI, begun in 2016, is a collaborative effort led by the Alabama Department of Conservation and Natural Resources State Lands Division Coastal Section and the Weeks Bay Reserve with funding from the National Oceanic and Atmospheric Administration (NOAA). An advisory team that includes the Alabama Department of Economic and Community Affairs (ADECA), Baldwin County Soil and Water Conservation District, City of Orange Beach, Coastal States Organization, Federal Emergency Management Agency (FEMA), Grand Bay National Estuarine Research Reserve, MS-AL Sea Grant, NOAA, Smart Home America, and South Alabama Regional Planning Commission collaborates with communities in Mobile and Baldwin counties to address flooding and floodplain management problems. SAFE-T was created as a network of practitioners to increase floodplain management capacity through shared challenges, solutions, and resources.



To establish SAFE-T, partners in the project reached out to floodplain managers, consultants, and community officials to establish the group’s foundation, and the first meeting was held in July 2018 with a goal to meet quarterly thereafter. Since that inaugural gathering, 15 meetings and trainings have been held with a range of participant expertise from both sides of Mobile Bay, including municipal and county floodplain managers, engineers, emergency managers, surveyors, insurance agents, and realtors. Throughout 2018 and 2019, SAFE-T met in-person, typically over a good hot lunch. Topics discussed have included government versus private market flood insurance, elevation certificates, data-driven flood research, and how local communities are using drones to communicate post-disaster conditions.

SAFE-T organizers faced a new challenge in 2020 amidst the COVID-19 pandemic. How does one keep the ball rolling on an initiative whose goal is to bring people together during a time when in-person gatherings are discouraged? To maintain SAFE-T’s momentum and also continue to offer professional education credit opportunities for the group’s attendees, SAFE-T has transitioned (for now) to a virtual forum. When asked about training needs over the past several years, learning more about FEMA’s process to revise flood insurance rate maps has been a consistent theme among the group. This past October, SAFE-T organizers partnered with ADECA and Wood Consulting to offer two three-hour virtual trainings for community officials and those making flood map change requests. So far, nine webinars and virtual trainings have been held on topics



Pre-COVID SAFE-T meeting

including sea-level rise, hurricanes and global warming, environmental justice, and facilitating virtual meetings.

Most recently, a virtual introduction to FEMA’s Community Rating System was held in January 2021. The Community Rating System is a program that rewards communities for taking flood management actions that go above and beyond minimum standards. Communities receive “points” for these efforts, and property owners in that community are rewarded with discounts on their flood insurance premiums. Of the 27 communities in coastal Alabama, five are currently participating in the program: Dauphin Island, Baldwin County, Foley, Gulf Shores, and Orange Beach. Alabama lags in participation compared to nearby states, so a long-term goal of the Community Resilience Initiative has been to encourage more participation.

For the immediate future, SAFE-T will continue to bring flood management professionals together over our computer screens and telephones. We look forward to the day we can meet (and eat) together again in person to tackle flood issues.



Using *Deepwater Horizon*-Related Funding Sources to Increase Shoreline Resilience in Coastal Alabama

TOM HERDER, WATERSHED PROTECTION COORDINATOR, MOBILE BAY NATIONAL ESTUARY PROGRAM
AERIAL PHOTOGRAPHY BY SAM ST. JOHN, (FLYTHECOAST.COM)

Fowl River Marsh Spits

Ten years ago, the *Deepwater Horizon* (DWH) oil rig exploded and sank off the coast of Louisiana, and 3.19 million barrels of oil gushed from the damaged Macondo well for 87 days. The economic impact to the Gulf states was devastating, and shorelines along Louisiana, Alabama, Mississippi, and Florida were impacted, along with recreational and commercial fisheries, marine mammals, sea turtles, birds, and wildlife. However, from shared fear of impending doom, the Gulf and Gulf states emerged, demonstrating resilience in recovery from the disaster. Criminal penalties, a Natural Resource Damage Assessment settlement, and Clean Water Act civil fines resulted in millions of dollars available for us to spring back and restore our damaged natural resources and economies. With shoreline edge habitats supporting the State's fisheries and protecting upland properties, stresses related to wind and wave energy, erosion, and lack of available sediments, restoration of shorelines became a major focus of DWH-related funding.

Three major DWH-related funding sources include:

① The Gulf Environmental Benefit Fund (GEBF). In early 2013, courts approved plea agreements resolving criminal cases against BP and Transocean with a \$356 million share for Alabama administered through the National Fish and Wildlife Foundation's (NFWF's) GEBF for projects directly benefiting Gulf natural resources impacted by the spill.

② The Natural Resource Damage Assessment (NRDA). Through the NRDA process, Trustees from the Department of the Interior, NOAA, states, and Indian tribes specified a monetary cost of the spill on natural resources, including people's lost use of the resources. Parties responsible for the DWH spill negotiated a legal settlement with Trustees for \$8.8 billion. Alabama's share of \$296 million will be disbursed over a 15-year period.



Northern Tip of Mon Louis Island



Salt Aire Shoreline Restoration



Deer River Marsh Shoreline

③ The Resources and Ecosystems Sustainability, Tourist Opportunities, and Revived Economies of the Gulf Coast States (RESTORE) Act.

This settlement included an additional \$5.5 billion from Clean Water Act civil penalties with which the RESTORE Act established a Restoration Trust Fund overseen by the Gulf Coast Ecosystem Restoration (Federal) Council and the Alabama Gulf Coast Recovery (State) Council to restore both resources and economies.

All three sources have been used to fund projects designed to help shorelines bounce back from the pressures of erosion with sea level rising and storms getting stronger and more frequent. A map of project locations is included on page 11.

NFWF Gulf Environmental Benefit Fund (GEBF)-Funded Projects.

The **Fowl River Watershed Restoration** grant funded a sediment loading analysis of the River, development of a management plan for the Watershed, and restoration of the eroded and storm-vulnerable Bay shoreline along the northern tip of Mon Louis Island. With only 65 feet separating the scarped Bay shoreline from a lee-side Fowl River embayment, eight acres of healthy marsh habitat was imperiled. Locating good enough material for marsh creation challenged the project, before some was located nearby in the Fowl River Offshore Disposal Area. Enough was hydraulically dredged to create an additional 4.5 acres of new marsh protected by a robust riprap revetment installed along the Island's 1995 footprint. The neglected and shallow Fowl River inlet was dredged to restore navigation and provide material to refill the borrow pit and avoid negative water quality impacts. The restored, protected

marsh has endured several inundations, including, Hurricanes Sally and Zeta, demonstrating resilience at the mouth of Fowl River.

The Fowl River Watershed Management Plan identified several wetland spits with receding shorelines and unhealthy marshes in the zone where upstream freshwater transitions into more brackish water. After an MBNEP Science Advisory Committee study investigated potential stressors to these marshy land forms, NFWF provided \$1.64 million in 2016 to fund the MBNEP's **Fowl River Watershed Restoration Coastal Spits and Wetlands Project – Phase I**. The grant will pay for engineering and studies to design a solution to stabilize four priority spit shorelines and restore marshland throughout intertidal portions of the river. Implementation funding is expected once designs are finished.

The **Mobile County Conservation Acquisition and Salt Aire Shoreline Restoration** involved using a \$4.2 million, 2015, GEBF grant for the County Commission to purchase the 233-acre, habitat-rich Salt Aire parcel north of the mouth of Fowl River. The Commission

leveraged that acquisition to secure an additional \$12.7 million from NFWF in 2017 to stabilize and restore a mile of degraded shoreline and 30 acres of backwater coastal marsh. Approximately 5,600 feet of segmented, low-profile breakwaters were installed, and 150,000 cubic yards of dredge material will be beneficially used to create new marsh habitat.

The Deer River marsh shoreline, fronting Mobile Bay and bordered on the north by the Theodore Industrial Canal, has receded by 160 feet and lost 19 acres of shoreline edge and salt marsh habitats since 1997. The otherwise-healthy 275-acre Deer River marsh system has been impacted by Mobile Bay sediments introduced through a gaping breach from the Bay into a tidal creek's eastern-most "oxbow." The **Deer River Coastal Marsh Stabilization and Restoration Project – Phase I** is using \$750K from the NFWF GEBF secured in 2018 to complete engineering and design to stabilize the one-mile-wide shoreline using living shoreline measures, improve natural function in the extensive system of marshes and tidal creeks, and potentially create new marsh habitat.



Lightning Point



Little Dauphin Island Restoration Assessment

In 2016, The Nature Conservancy secured \$5.9 million from the GEBF for its **Lightning Point Acquisition and Restoration Project – Phase I**. The funds were used to purchase more than 100 acres of coastal habitat near the mouth of the Bayou La Batre River, develop plans for restoring eight acres of existing marsh, and creating 40 acres of new marsh with two miles of tidal creeks. A mile and a half of intertidal, nearshore rock breakwaters were constructed to protect more than two miles of undeveloped waterfront of protected lands owned by the State, Mobile County, and the City Bayou La Batre. **Phase II** of the project, funded with \$16.6 million from the GEBF, was used for construction activities from 2018 to 2020 to create marsh and install seven 500-ft breakwaters (expected to develop into reefs providing habitat for fish and shellfish) and two jetties (800 ft and 700 ft long) to protect 127 acres of newly acquired coastal habitat

for management by the Alabama Forever Wild Land Trust Program and the City.

In 2017, the U.S. Army Corps of Engineers (USACE) secured \$1.5 million for the **Little Dauphin Island Restoration Assessment** to study both nearshore and onshore restoration options for a project to enhance and protect Little Dauphin Island. This portion of the Bon Secour National Wildlife Refuge is an important nesting and foraging area for coastal birds, including several imperiled shorebird species.

In 2014, the Alabama Department of Conservation and Natural Resources (ADCNR) used a GEBF grant for the **Alabama Barrier Island Restoration Assessment** to utilize USACE and U.S. Geological Survey expertise to assess restoration alternatives to protect the current and future function of Dauphin Island, Alabama's only barrier island. In 2020, the Town of Dauphin Island secured \$1.4 million dollars from the GEBF for

engineering, design, and permitting for **Dauphin Island East End Beach and Dune Restoration – Phase I**. The initial concept involves placing 1.2 million cubic yards of sand along 4,800 feet of shoreline to restore 35 acres of beach and dune habitat on the east end of the Island. Planting and sand fencing will be included to assist in retaining sand on the restored beach and dune system.

With funding from two \$250K grants secured by the MBNEP in 2018 from NFWF GEBF and Resilient Communities Grant Program, the Mobile County Commission is overseeing **Dauphin Island Causeway Shoreline Restoration – Phase I**. Engineering and design plans include construction of breakwaters to enhance, protect, and improve resilience of marsh and oyster habitat adjacent to the storm-vulnerable, 10,900-ft Dauphin Island Causeway between Heron Bay Cutoff and Jemison's Bait Shop at the foot of the Dauphin Island Bridge. Highway 193, through Alabama's most active and productive oyster harvest area, provides the single vehicular access to Dauphin Island as well as the single emergency/hurricane evacuation route from the State's only barrier island. The State and County secured \$19 million from the GEBF with an additional \$4.9 million from the NFWF Emergency Coastal Resilience



Dauphin Island East End Beach and Dune Restoration – Phase I



Dauphin Island Causeway Bayfront Park Restoration



Marsh Island Restoration Project



Alabama Swift Tract Living Shoreline Project

Fund in 2020 for **Phase II** to finish design and construct breakwaters and coastal marsh in Mobile Bay on the east side of the Causeway.

Natural Resource Damage Assessment - (NRDA) Funded Projects

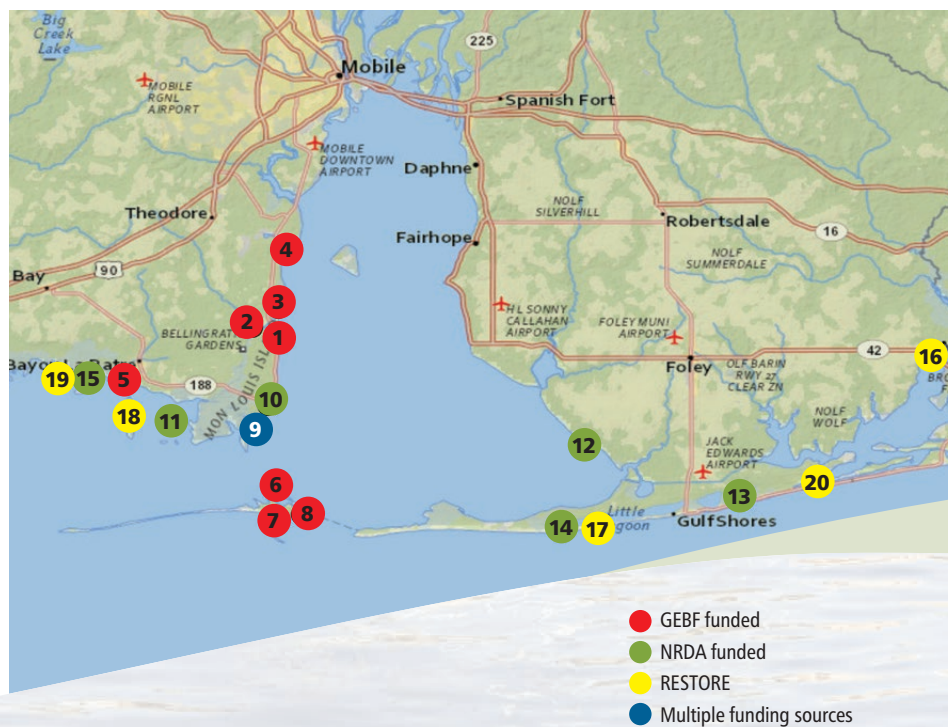
With \$1 million in NRDA funding secured for **Bayfront Park Restoration and Improvements**, the ADCNR entered into an agreement with the Mobile County Commission to perform engineering and design to evaluate constructing a living shoreline and/or sandy beach along Bayfront Park's currently armored Mobile Bay shoreline. The resulting plan broke down construction activities into two phases, IIa and IIb, to implement shoreline improvements including headland breakwaters (using existing riprap) and

sand pocket beaches and to design access-related infrastructure, using low impact development techniques. Through strong active partnerships with the MBNEP, Mobile County, NFWF, and NOAA, the State will coordinate a series of different funding opportunities to restore the Bay's western shore contiguously from Bayfront Park in Alabama Port south along Highway 93 to Jemison's.

The ADCNR secured \$11.3 million in early NRDA funding for the **Marsh Island (Portersville Bay) Restoration Project** in 2012 for engineering design to create and protect habitat. The State beneficially used 245,000 cubic yards of dredge material to create fifty acres of salt marsh and installed a 3,000-ft permeable, segmented breakwater to protect both the new existing 24 acres

of Marsh Island, which had been experiencing shoreline loss. Construction was completed in 2017. The award includes a five-year monitoring program.

With \$5 million in early NRDA funding secured in 2015, NOAA began implementation of the **Alabama Swift Tract Living Shoreline Project**, performing surveys, obtaining permits, and preparing engineering and design documents for an eastern portion of Bon Secour Bay before construction in 2016. Installation of 1.7 miles of breakwaters was used to dampen wave energy, reduce shoreline erosion, and provide fish and shellfish habitat. The project is adjacent to the 615-acre Swift Tract parcel, part of the Weeks Bay National Estuarine Research Reserve.



- GEBF funded
- NRDA funded
- RESTORE
- Multiple funding sources

PROJECT LOCATIONS

1. Northern Tip of Mon Louis Island
2. Fowl River Watershed Restoration Coastal Spits and Wetlands Project – Phase I
3. Mobile County Conservation Acquisition and Salt Aire Shoreline Restoration
4. Deer River Coastal Marsh Stabilization and Restoration Project – Phase I
5. Lightning Point Acquisition and Restoration Project
6. Little Dauphin Island Restoration Assessment
7. Alabama Barrier Island Restoration Assessment
8. Dauphin Island East End Beach and Dune Restoration – Phase I
9. Dauphin Island Causeway Shoreline Restoration
10. Bayfront Park Restoration and Improvements
11. Marsh Island (Portersville Bay) Restoration Project
12. Alabama Swift Tract Living Shoreline Project
13. Alabama Dune Restoration Project
14. Little Lagoon Living Shoreline Project
15. Point aux Pins Living Shoreline Project
16. Lillian Park Beach Habitat and Shoreline Protection
17. Little Lagoon Restoration Project
18. Southeastern side of Coffee Island
19. Southern Tip of Point aux Pins
20. ADCNR Boggy Point Boat Ramp



Little Lagoon Restoration Project

The cities of Gulf Shores and Orange Beach, the State, the U.S. Fish and Wildlife Service, and the Bureau of Land Management received \$1.5 million from NRDA in 2018 for the **Alabama Dune Restoration Project** to cooperatively restore and manage 55 acres of primary dune habitat by planting native dune vegetation and installing sand fencing, dune walkovers, and educational signage.

In 2018, the U.S. Fish and Wildlife Service, Mississippi State University, and The Nature Conservancy secured \$261 thousand in NRDA funds for the **Little Lagoon Living Shoreline Project**. Project managers will use living shorelines measures to restore at least 2,200 feet of heavily eroded shoreline along the southwestern corner and southern shore of Little Lagoon in the Bon Secour National Wildlife Refuge. Restoration will include a combination of evaluation, planning, and installation of a living shoreline made of biodegradable coconut fiber logs and other wave-breaking structures, native marsh plantings, and/or native mussel seeding.

The project will also reduce erosion of nearby habitat supporting endangered Alabama beach mouse and help create more storm-resilient and biologically productive shoreline habitats.

The ADCNR used \$3.8 million from NRDA to design, construct (in 2020),

and monitor the **Point aux Pins Living Shoreline Project** to reduce erosion by reducing wave height and energy while enhancing the ecosystem productivity of the area. Fifteen offshore, 200-ft breakwater segments were installed with 80-ft gaps to supplement four existing oyster shell breakwaters, resulting in a mile of protected shoreline. Over time, the breakwaters are expected to provide habitat supporting benthic productivity, including bivalve mollusks, annelid worms, shrimp, crabs, and small forage fishes.

RESTORE Act -Funded Projects

The Baldwin County Commission secured \$626 thousand in RESTORE funding in 2016 for **Lillian Park Beach Habitat and Shoreline Protection** to address loss and degradation of shoreline and intertidal habitats at the Park. The project will create and enhance 700 linear feet of beach habitat by removing, repairing, or replacing existing and poorly performing breakwater structures. Interpretive and educational materials strategically placed in the park will increase public awareness of watershed issues.

The City of Gulf Shores secured almost \$6 million through the RESTORE Act for the **Little Lagoon Restoration Project** to restore or improve 2,500 acres of coastal habitat. Project components

include installation of 1,000 linear feet of living shoreline structures, improved hydrological connectivity in the canal system connection the system of dune lakes, conversion of 200 septic systems to sanitary sewer, shellfish restoration programs, marsh and seagrass restoration, modeling, research, and monitoring.

In 2020, ADCNR secured over \$4 million from RESTORE for **Comprehensive Living Shoreline Monitoring**. A plan will be initially developed for monitoring and assessing the performance of at least 10 proposed and existing living shorelines projects in coastal Alabama. It will develop a standard set of monitoring parameters allowing for robust comparisons of effectiveness of various habitat-friendly shoreline stabilization techniques and accurate evaluation of their success relative to specific and variable site conditions. The lion's share of the funding will utilize the monitoring plan to implement a comprehensive living shorelines monitoring program over five years at a minimum of 10 projects in coastal Alabama. Annual monitoring reports a final five-year Comprehensive Monitoring Report would be produced.

The State secured \$6.25 million of RESTORE funding in 2020 to partner with the USACE on the **Alabama Living Shorelines Program**. Almost \$1 million will be used to perform preliminary planning, engineering, design, regulatory compliance, and permitting for construction of three living shoreline projects in Mobile and Baldwin counties. Goals include augmenting and modifying existing breakwaters on the **southeastern side of Coffee Island**, planning and designing living shorelines measures along the southeastern and **southern tip of Point aux Pins** to mitigate chronic erosion and shoreline loss there, and design living shoreline measures adjacent to the **ADCNR Boggy Point Boat Ramp** in Orange Beach to restore and protect existing shoreline and salt marsh habitat. The balance of the funded would be used to construct and install the living shorelines designs developed during preliminary planning and for five years of post-construction monitoring.



Point aux Pins Living Shoreline

The City of Fairhope Makes Strides to Improve Stormwater Infrastructure

By DR. TRACIE SEMPIER, MISSISSIPPI-ALABAMA SEA GRANT CONSORTIUM

Coastal communities are at risk to natural, economic, and technological disasters. To address individual community needs and vulnerabilities, the Gulf of Mexico Alliance and the Mississippi-Alabama Sea Grant Consortium provided small grants for communities through the NOAA Regional Coastal Resilience Grant.

While significant funding may be available to communities after a disaster, there are not many existing funding opportunities for communities that want to take proactive measures to become more resilient before the next storm. This small grant program filled a real need for eight communities, as well as provided a series of “demonstration projects” at the local level we can learn from and share with communities around the Gulf.

In Alabama, the City of Fairhope received funding to address stormwater needs in a marginalized community in Tatumville Gully Watershed. The City of Fairhope is situated on the eastern shore of Mobile Bay in Baldwin County, in southwest Alabama. Fairhope’s rainfall averages more than 69 inches per year. Sustainable development continues to be a priority in preserving Fairhope’s natural resources. Fairhope is frequently affected by severe storms, flooding, hurricanes, and tornadoes. All have a high probability of occurring, and the City has been significantly impacted by numerous federally declared disasters.

The 2012 Stormwater Study, Annual MS4 Storm Sewer Inventory, and the City’s Community Resilience Index assessments each identified the Tatumville Gully Watershed as a particularly vulnerable area. The Gully is experiencing many threats including erosion, flooding, invasive species, and many older homes on low lying parcels. In addition, it is located



Sediments compromising a Tatumville stormwater conveyance.

in a historic black community, which has the highest concentration of low-income and vulnerable residents in the City.

The City is improving stormwater management infrastructure by using low impact engineering that protects, enhances, and improves the natural coastal resources while increasing its sustainability, resilience, and preparedness. Fairhope secured the services of Mott McDonald Engineers to locate and place the stormwater infrastructure for the Watershed into the City’s GIS system, with elevation and size data, and generate hydrologic/hydraulic models necessary to evaluate and predict stormwater flows/levels using current conditions as a baseline. Scenarios were run using the hydrologic and hydraulic models to determine if certain recommendations would increase or decrease stormwater flow. The Stormwater Study made recommendations for offsetting stormwater discharges by

increasing pipe size and installing new ponds to provide greater storage volume and modeled low areas as possible detention for upstream ponds.

Concurrent with the Stormwater Study, the City conducted the South Fairhope Community Action Plan with the assistance of the Gulf Coast Community Design Studio. The City has begun work to improve the Young Street Community Park as well as meet the needs of elderly citizens in the area as identified in the Plan. The Plan also addresses housing conditions and recommends strategies for making retrofits more accessible and affordable for those with limited resources. There are also recommendations for identifying key stormwater holding areas to place into conservation and a call to review current policy and enforcement mechanisms of stormwater management to reduce impacts of future development.

Other small grant awardees tackled projects at the local government level, such as developing business continuity plans, reducing erosion to protect culturally significant artifacts, enhancing habitat, and increasing capacity to respond to future hazards. Collectively, these community small grant projects have taught us that new tools are not always necessary to build resilience, smaller amounts of funding can fill a real need, and networking of communities and practitioners to collectively learn from one another builds resilience at the local level. For a complete listing of resources and deliverables, please visit: <https://gulfofmexicoalliance.org/regional-coastal-resilience/>.

Hydrologic Models Allow Local Governments *to Understand and Manage Stormwater-Related Flooding*

BY JOHN CURRY, PRESIDENT, HYDRO-ENGINEERING SOLUTIONS AND LESLIE GAHAGAN, ENVIRONMENTAL DIRECTOR, CITY OF FOLEY

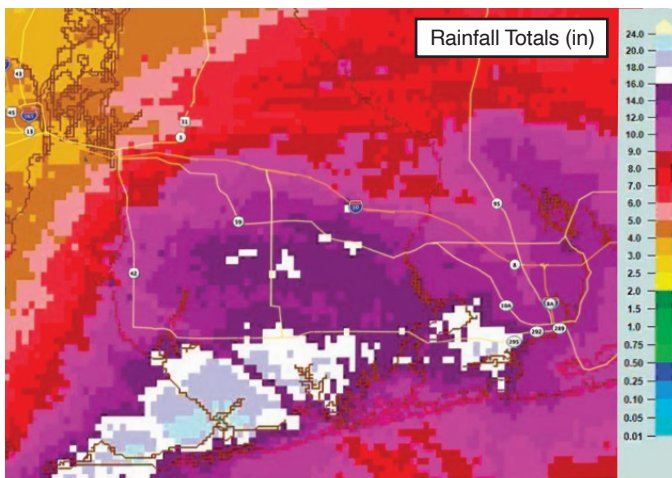


Figure 1. Rainfall amount contours as of 9 am on September 16, 2020, with watersheds overlay

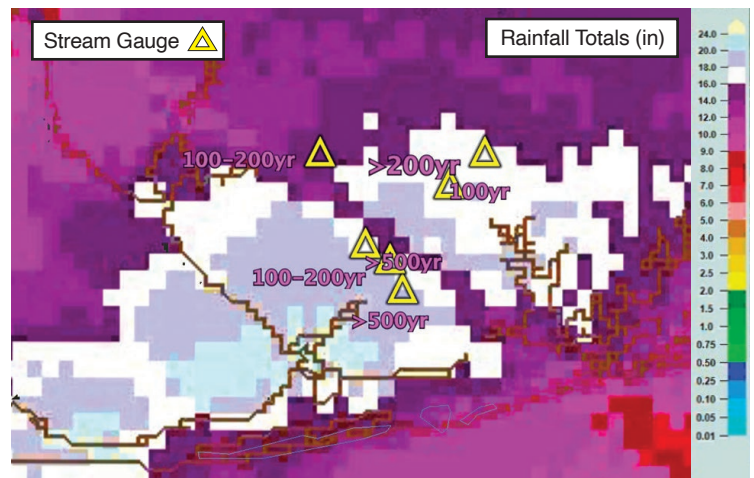


Figure 2. Rainfall contours with discharge recurrence intervals from stream gauges

The Mobile Bay National Estuary Program funded a hydrologic modeling program of watersheds in Baldwin and Mobile counties. Foley is one of the cities that has benefited from this modeling program. Hydrologic modeling has provided an excellent planning tool for the City of Foley, which has experienced tremendous changes in land use over time from forested and agricultural to urban. With characteristic high levels of annual rainfall typical to this region and very little topographic relief, Foley tends to experience regular occurrences of localized flooding from stormwater. Citizens perceive flooding to be related to storm surge or river stages, but accumulations of stormwater runoff have increased with changing land uses. Modeling has provided a way to locate potential regional stormwater facilities to capture runoff and detain it until

receiving stream flows diminish and drainage capacity increases.

As part of calibrating these watershed models to actual storm events, stream gauges were installed with telemetry at strategic locations within target watersheds. In addition, static cork/crest stream gauges were installed downstream from the telemetry gauges. Both gauges measure water surface elevations; one measures continuously and the other measures only the highest water mark during any event. Both of these gauges, together, allowed us to obtain the slope of the water surface elevations during flood events. Cross-sections were surveyed, and hydraulic models were developed for determining a stage discharge relationship at each gauge. This was done by matching the water surface slopes measured in the field to the modeled water surface slopes.

Once the stage/discharge relationship was developed, the continuous measured stages could be transformed during an event to a hydrograph. This hydrograph

was used in the calibration of specific events for determining timing within the watershed models. The side benefit of this data is when Hurricane Sally occurred, it was very easy to go to these locations and quickly determine the discharge to define what kind of flood event it experienced (e.g., 100-year flood event, or one with a 1% chance of happening during any given year). This information can be used for applying for emergency funds or providing quick information to State, county, and city leaders to inform the public. Moving forward as projects are determined within these watersheds, Hurricane Sally can be used as a threshold design event, similar to how the April 29, 2014 extreme flooding event was used in the calibrated model of the D'Olive Watershed. This hydrologic model was used for computing discharges for each proposed project. These discharges were then used in hydraulic models to reduce risk designs by identifying high velocity and shear stress zones while in the design process. *Continued top of page 15*

Hydrologic Models *Continued from page 14*

Additionally, converted radar rainfall is often used for screening what roads and bridges need to be inspected after a large storm event, and the rainfall will be used to give an idea of storm recurrence intervals. When dealing with tropical and convective storms, it is not always reliable to just use converted radar to rainfall amounts, due to high winds and atmospheric conditions that can introduce significant error into the conversion. Rainfall radar information captured for the Hurricane Sally event is shown in Figure 1. Due to the Hurricane disrupting delivery of power throughout the area, a lot of the rain gauges with telemetry we used for ground-truthing the converted radar to rainfall was unavailable, and since the rainfall covered such a large area, it made it very meaningful to combine the rainfall overlay with the discharges for comparison to confirm that the flooding correlated well with the high rainfall amounts shown in Figure 2. Having all this information

compiled together, the data was sent to Baldwin County and to the City of Foley for their use. Baldwin County's engineer sent it to his Emergency Management Agency staff and to County Commissioners. He also used it for supporting documentation and to help explain the damage seen for funding requests from the Federal Emergency Management Agency and National Resources Conservation Service. The City of Foley used it for providing information about the rainfall totals and recurrence intervals to affected residents. This helped them understand why their area experienced flooding. For example, and as evident in Figure 2, one neighborhood experienced a 500-year storm event (0.2% recurrence interval) and wondered why they flooded so much worse than areas only a few miles east of them. The data showed the area to the east had only experienced a 200-year event (with a 0.5% recurrence interval).

The Lodge at Gulf State Park *Continued from page 2*

The Lodge was designed to optimize all of the services intact ecosystems provide, while also creating a beautiful vacation setting for guests. Its landscape will require careful maintenance only until the wetland and dune vegetation is fully established, after which vegetation will continue to spread and reseed through natural processes. At that point maintenance is reduced to monitoring ecosystem health and guarding against the spread of invasive species. State-of-the-art amber-hued LED lighting was installed at both the Lodge and the Pier to protect nesting and hatching sea turtles.

The Lodge is also the world's first certified FORTIFIED™ commercial building, with above-code structural design, additional safety factors, and building materials and installation methods rigorously tested to resist hurricane-force winds. A recent Scientific American article touted Alabama's two coastal counties, Baldwin and Mobile, as "the nation's leading adopters of this nationally recognized building standard," crediting it for saving 16,000 homes from impacts of Hurricane

Sally. While much of Baldwin County suffered significant damage from Sally, the Lodge emerged relatively unscathed.

Built to standards developed by the Insurance Institute for Building and Home Safety in 2012, the FORTIFIED™ Lodge was designed to withstand 150 mph hurricane force winds. The foundation of the design included 657 60-foot-long pilings, each driven 45 feet into the ground. Detailed hydrologic modeling was used to determine ideal locations and elevations for its structures, and the lowest point of any building is three feet higher than the highest expected storm surge.

Guests enjoying the Lodge might be unaware of the technical design considerations resulting in LEED, SITES, and FORTIFIED certifications, but informative signage will be used to share this technology with visitors facing similar pressures on the coast. The State hopes that visitors will return year after year to this resilient and luxurious facility to sustainably enjoy the white sands and blue waters of Alabama's Gulf of Mexico coast.

Alabama current connection

About the Mobile Bay National Estuary Program:

The Mobile Bay National Estuary Program's mission is to lead the wise stewardship of water quality and living resources of Mobile Bay and the Tensaw Delta. The MBNEP serves as a catalyst for activities of estuary stakeholders, helping to build community-based organizational capacity for sound resource management and leveraging commitment and investment to ensure the estuary's sustainability. For more information, please contact the MBNEP office at 251-431-6409.

About ADCNR, State Lands Division, Coastal Section:

In an effort to protect and enhance coastal resources and reduce potential conflicts between environmental and economic interests, the Alabama Coastal Area Management Program (ACAMP) was approved by the National Oceanic and Atmospheric Administration (NOAA) in 1979. The ACAMP is administered through the Alabama Department of Conservation and Natural Resources, State Lands Division, Coastal Section. For more information, please contact the Coastal Section office at 251-621-1216.

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Alabama Current Connection encourages reprinting of its articles in other publications. If you have recommendations for future articles or would like to subscribe, please contact the editor:

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SAVE THE DATE

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Corpus Christi, TX 78412

**VICTORIA, TX
TUESDAY, AUGUST 6**

VICTORIA COLLEGE EMERGING
TECHNOLOGY COMPLEX
7403 Lone Tree Road
Victoria, TX 77905

**TEXAS CITY, TX
THURSDAY, AUGUST 8**

NESSLER CENTER
2010 5th Avenue North
Texas City, TX 77590

Join us from 9:00 a.m. to 2:00 p.m. for informative presentations and hands-on demonstrations designed to beautify and protect your property's shoreline. Lunch will be provided.



Photo by Sam St. John, FlyTheCoast.com